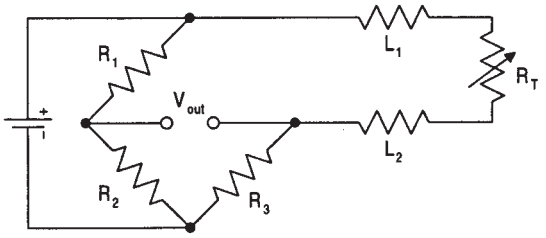
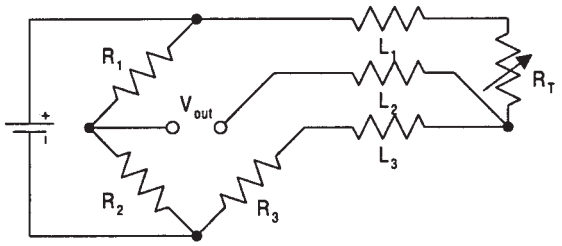
TEMPERATURE CIRCUITS

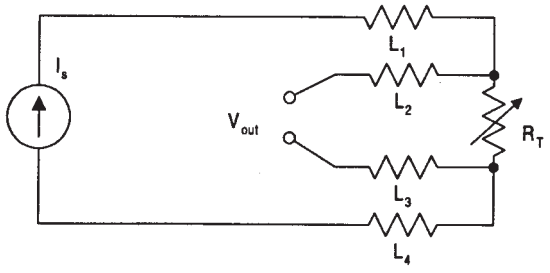
2-WIRE CIRCUIT: A Wheatstone bridge is the most common approach for measuring an RTD. As R_T increases or decreases with temperature, V_{out} also increases or decreases. Use an op-amp to observe V_{out}. Lead wire resistance, L_1 and L_2 directly adds to the RTD leg of the bridge.



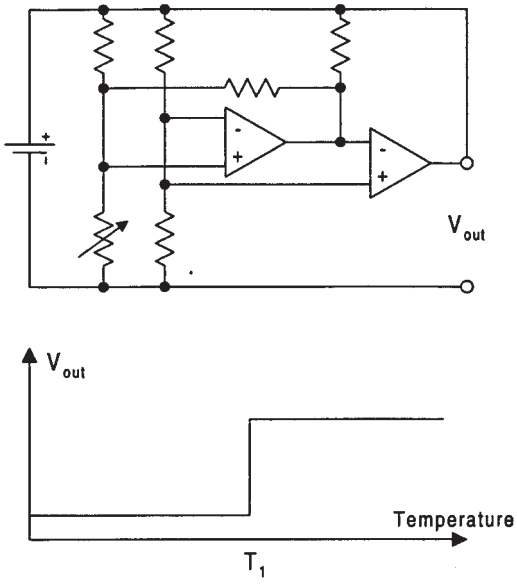
3-WIRE CIRCUIT: In this approach, L_1 and L_3 carry the bridge current. When the bridge is in balance, no current flows through L_2 so no L_2 lead resistance is observed. The bridge becomes unbalanced as R_T changes. Use an op-amp to observe V_{out} and prevent current flow in L_2. The effects of L_1 and L_3 cancel when $L_1 = L_3$ since they are in separate arms of the bridge.



4-WIRE CIRCUIT: A 4-wire approach uses a constant current source to cancel lead wire effects even when $L_1 \neq L_4$. Use an op-amp to observe V_{out} and prevent current flow in L_2 and L_3.



TEMPERATURE SWITCH
The following circuit causes an output voltage to rail whenever the temperature of the RTD rises above a fixed value T_1. The open-collector output simplifies the interfacing of this circuit with additional electronics.



TEMPERATURE SWITCH WITH HYSTERESIS
The following circuit uses positive feedback from the output to self heat the RTD enough to develop a hysteresis in the behavior of the switch. Once on, the temperature must drop low enough to offset the self heating before the switch will disable.